2002 Report to the Legislature

Allocation of Accumulated Columbia Basin Groundwater

January 2003

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Allocation of Accumulated Columbia Basin Groundwater

Implementation of Substitute House Bill 2874

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Executive Summary

During the past 50 years, irrigation of the central Columbia Basin has transformed the basin from an area of rangeland and dryland farming into an area with some of the most productive agricultural lands in the country. Imported irrigation water over the last 50 years has infiltrated into the ground and commingled with the naturally occurring groundwater. In some areas of the Columbia Basin, there are significant amounts of stored water as a result of the Columbia Basin project.

Chapter 508-14 WAC sets forth interim polices to guide the Department of Ecology (Ecology) in granting the authority to make withdrawals of commingled naturally occurring and artificially stored groundwater. Substitute House Bill (SHB) 2874 allows the department of Ecology and United States Bureau of Reclamation (USBR) to enter into agreements to allocate groundwater within the geographic area of the WAC 508-14. The legislature through passage of SHB 2874 required Ecology to report annually in December on progress to implement the legislation.

Implementation Progress

In early spring of 2002 after the passage of SHB 2874, Ecology and the USBR met together with the Columbia Basin irrigation districts to discuss post legislation work plans and information needs. Two formal committees were established:

1. A policy committee comprised of senior managers and legal counsel from Ecology, USBR and the Columbia Basin irrigation districts. The policy committee would decide and craft the agreement, determine if additional technical studies are needed, and allocate resources to accomplish a pilot program to allocate water within the WAC 508-14 area.

2. A technical committee comprised of senior hydrogeologists and engineers from Ecology, USBR and the Columbia Basin irrigation districts. The technical committee would review the technical reports and groundwater data and make recommendations to the policy committee concerning impacts to the Columbia River system and Columbia Basin project operations.

Additionally, at the spring meeting a decision was made to have the technical committee review the existing United States Geological Survey (USGS) report for the Pasco Basin, which includes the WAC 508-14 area, and update the report with any current data and make a recommendation on allocating water for a pilot project. The pilot project would allocate blocks of water from the Franklin County portion of the 508-14 area for 50 pending applications and would reserve water for future uses.

The technical committee met several times throughout the spring and summer of 2002 and developed a technical memorandum in August of 2002. The technical committee determined that a pilot program to allocate 16,000 acre feet of water could safely be done from the WAC 508-14 area with minimal impact to the Columbia River system.

Future Efforts Required to Implement SHB 2874

A meeting is scheduled for December 19, 2002 with the policy committee and technical committee to discuss the following actions to implement SHB 2874:

- Review of the technical committee memorandum with the Columbia Basin irrigation districts and the recommendations within the report.
- Discuss a strategy for consultation by USBR and Ecology with National Marine Fisheries Service regarding the potential impact to the Columbia River from the WAC 508-14 pilot program.
- Scope the development of the agreement required within SHB 2874 and develop timelines to finalize the agreement
- Development of a draft scope of work for collection of groundwater monitoring data within the pilot project area.
- Discuss proposed rule language to revise WAC 508-14 rule to implement SHB 2874 and the agreement between the USBR and Ecology.

Allocation of Accumulated Columbia Basin Groundwater
Implementation of Substitute House Bill 2874

Introduction

Background

During the past fifty years, irrigation of the central Columbia Basin has transformed the basin from an area of rangeland and dryland farming into an area with some of the most productive agricultural lands in the country. Most of the irrigation water comes from imported surface water through a network of canals and ditches built for the Columbia Basin project. Much of the introduced irrigation water has infiltrated into the ground where it has commingled with natural groundwater. As a result, the groundwater system throughout much of the basin now has a large component of "artificially stored" water that was not present before the Columbia Basin project began.

In 1945, the state of Washington enacted a law to regulate public groundwater (Chapter 90.44 RCW). In 1985, it was revised to include provisions for identifying and designating groundwater management areas in order to protect groundwater quality, to assure groundwater quantity, and to effectively manage water resources to meet future needs (RCW 90.44.130 and 90.44.400). In 1985, the Department of Ecology (Ecology) promulgated regulations (Chapter 173-100 WAC) to implement RCW 90.44.130 and 90.44.400. These regulations, revised in 1988, establish guidelines, criteria, and procedures for designating groundwater management areas.

In 1969, the state of Washington promulgated a rule (Chapter 508-14 WAC) to curtail further groundwater development in a defined area of the Columbia Basin project area known as the Quincy Basin, pending the outcome of a detailed groundwater investigation to determine if further appropriation of public groundwater in that area should be allowed. Following completion of the groundwater investigation, Ecology identified a "practical groundwater management unit in the Quincy Basin area" and in 1973 promulgated regulations (Chapter 173-124 WAC) to establish aerial boundaries and depth zones for that groundwater management unit. In 1988, WAC 173-124 was revised and the Quincy Groundwater Management Subarea was formally designated (Figure 1).

A second groundwater management unit, the Odessa Groundwater Management Subarea was subsequently designated by Chapter 173-128A WAC (Figure 1). Chapter 508-14 WAC was then revised to define the boundaries of the area remaining in the Columbia Basin project outside the formally designated Quincy and Odessa Groundwater Management Subareas (WAC 508-14-030 [3]). That area is now informally known as the 508-14 Area and is the subject of this status report to the legislature on SHB 2874. It occupies parts of Franklin, Grant, and Adams Counties (Figures 1 and 2).

Chapter 508-14 WAC sets forth interim policies which guide Ecology in granting authority to make withdrawal of commingled "naturally occurring" and "stored" groundwaters in the 508-14 Area until a formal groundwater management subarea is established under the procedures set forth in RCW 90.44.400 and WAC 173-100. WAC 508-14-030 (2)(a) requires Ecology to issue permits to withdraw public ground water within the 508-14 Area if it appears to the department

that public groundwater is available for appropriation. However, WAC 508-14-030 (2)(a) also requires Ecology to issue all such permits with the condition that if the department subsequently determines that sufficient quantities of public water are not available, then the department may withdraw or modify the permits as necessary.

Impact of Columbia Basin Project Water on 508-14 Area Groundwater

Since the early 1950s, the delivery of Columbia Basin project water through canals and ditches, and its application to land through irrigation practices, has dramatically raised groundwater levels throughout much of the Columbia Basin project area, including the 508-14 Area. According to a study conducted by the United States Geological Survey (USGS Water-Resources Investigations Report 96-4086), the volume of groundwater in storage in the Pasco Basin, which includes the southern half of the 508-14 Area, has increased by approximately five million acre-feet since the project began. The vast majority of the increase is the result of seepage from water delivery canals and ditches and from infiltration of irrigation water, but groundwater levels have also risen locally within the Pasco Basin as a result of the formation of reservoirs behind dams constructed on the Columbia and Snake Rivers.

USGS WRI Report 86-4086 includes estimates of the volumes of "naturally occurring" and "stored" groundwater in the Pasco Basin. It also includes data that demonstrates by the late 1980s, the volume of groundwater flowing into and out of the Pasco Basin (and the southern half of the 508-14 Area) had nearly reached equilibrium, and groundwater levels had essentially stabilized.

Columbia Basin project water imported into the Pasco Basin (and the southern half of the 508-14 Area) has resulted in some benefits, including an increase in the volume of water available for beneficial use and a decrease of nitrate concentrations in groundwater as a result of dilution. On the other hand, the imported irrigation water has raised groundwater levels throughout much of the Pasco Basin which has had some deleterious effects, including an increase in slope instability and a decrease in the amount of arable land as a result of water ponding in areas with poor drainage.

Substitute House Bill 2874 (SHB 2874)

Legislative Intent and Requirements

In 2002, the Washington state legislature enacted SHB 2874 to amend Chapter 89.12 RCW, with the intent to authorize the Department of Ecology to enter into agreements with the United States for the allocation of groundwater that has accumulated as a result of the importation of surface water from the Columbia Basin project. RCW 89.12.170 requires the agreements and any allocation of water pursuant to the agreements to be consistent with authorized project purposes, federal and state reclamation laws, and provisions of United States' repayment contracts pertaining to the project. The agreements must provide that Ecology grant an application to beneficially use such water only if the department determines that the application will not impair existing water rights or project operations or harm the public interest. Use of water allocated pursuant to the terms of the agreements must be contingent upon issuance of licenses by the United States to approved applicants. RCW 89.12.170 also requires the department, with the

concurrence of the United States, to adopt a rule setting forth the procedures for implementing the agreements and the priorities for processing the applications. It authorizes Ecology to accept funds for administrative and staff expenses that it incurs in connection with entering into or implementing the agreements. RCW 89.12.180 requires the department to report annually (from 2002 to 2007) to the standing committees of the legislature with jurisdiction over water resources regarding the activities authorized by RCW 89.12.170.

Efforts Taken to Implement SHB 2874

Establishment of Committees for the 508-14 Area

In early spring 2002, the following policy and technical committees were established for the 508-14 Area:

Policy Committee

- George Schlender— Water Resources Eastern Region Section Manager, Ecology
- William Gray— Deputy Area Manager, USBR
- Donna Postma— Environment, Construction & Compliance Manager, USBR
- Richard Erickson— Manager, East Columbia Basin Irrigation District
- Keith Franklin— Manager, Quincy-Columbia Basin Irrigation District
- Shannon McDaniel— Manager, South Columbia Basin Irrigation District
- Richard Lamargie— Counsel for East and South Columbia Basin Irrigation Districts
- John Baird— Counsel for Quincy-Columbia Irrigation District
- Merle Gibbens— Grand Coulee Operations, USBR
- Brian Faller – Assistant Attorney General, Council for Ecology

Technical Committee

- Keith Stoffel— Hydrogeologist, Ecology
- John Covert— Hydrogeologist, Ecology
- Kayti Didricksen— Hydrogeologist, USBR
- Dan Hubbs— Hydrogeologist, USBR
- Darvin Fales— Engineer, South Columbia Basin Irrigation District

Development of Implementation Plan for SHB 2874

In April 2002, Ecology developed an Implementation Plan for SHB 2874. The plan included the following identified work tasks and projected schedule:

- May 3, 2002 – September 1, 2002 – Ecology and USBR negotiate agreement for 508-14 Area
- September 1 – December 1, 2002 – Ecology assists USBR (lead agency) in consultation with NMFS
- December 1, 2002 – Ecology submits first progress report to legislature
- December 1, 2002 – March 1, 2003 – Ecology and USBR develop technical details of groundwater allocation program
- March 1, 2003 – April 1, 2003 – Ecology files CR 101 to revise WAC 508-14
- April 1, 2003 – June 1, 2003 – Ecology files CR 102 draft rule language
- June 2003 – December 1, 2003 – Ecology conducts public workshops, solicits public comments, and develops final rule language
- December 1, 2003 – Ecology submits second progress report to legislature
- December 1, 2003 – February 1, 2004 – Ecology adopts revised rule and develops cost recovery contracts with USBR; Ecology hires a watermaster for Pasco Basin

- February 1, 2004 – Ecology begins making permit decisions for Franklin County portion of 508-14 Area

Policy Committee Kickoff Meeting

On May 3, 2002, the policy and technical committees met jointly to discuss emerging issues regarding the negotiation of an agreement between Ecology and the U.S. Bureau of Reclamation (USBR), which would contain provisions for the allocation of both "naturally occurring" and "stored" groundwater in the Franklin County portion of the 508-14 Area, hereafter known as the pilot project area (Figure 2). At the end of the meeting, the policy committee concluded that before an agreement could be drafted, the technical committee must complete a comprehensive hydrogeologic evaluation and a thorough assessment of existing water rights in the pilot project area.

Hydrogeologic Evaluation and Water Rights Assessment of the Technical Committee

Throughout late spring and summer 2002, members of the 508-14 technical committee conducted a hydrogeologic evaluation and an assessment of existing water right certificates, permits and pending applications in the pilot project area. Committee members met on several occasions to discuss technical issues and to ensure that Ecology and USBR committee members were in agreement with conclusions drawn by the committee. In early August, Ecology Director Tom Fitzsimmons and USBR Regional Director Bill McDonald met to discuss preliminary findings of the technical committee. In mid-September, the technical committee sent a memorandum to Bill Gray, USBR Deputy Manager, which contained a summary of groundwater issues and an impact assessment for the 508-14 pilot project (see Attachment 1). The memo was forwarded to Tom Fitzsimmons and Ecology water resource managers George Schlender, Joe Stohr, and Keith Phillips.

The following is a brief summary of the conclusions drawn and recommendations made by the 508-14 technical committee in the mid-September memorandum:

1) The technical committee has estimated the quantity of groundwater that flowed through the pilot project area prior to development of the Columbia Basin irrigation project to be 47,247 acre-feet/year. Prior to 1967, Ecology issued 54 water right certificates for 7,984 acre-feet/year of "state water" within the pilot project area. Since 1967, Ecology has issued 163 permits for 100,211 acre-feet/year of water in the project area, pending an assessment of the quantity of public groundwater available for appropriation. Therefore, the technical committee believes Ecology can issue water right certificates for the 49 most senior permits in the pilot project area, for a total of 39,263 acre-feet/year of the remaining "state water" in the area. The groundwater appropriated by the remaining 114 permits is Columbia Basin project water owned by the federal government and subject to federal licensing.

2) In 1986, the USGS reported that water levels in the Pasco Basin (including the Franklin County portion of the 508-14 Area) had essentially stabilized, with only a minor quantity of water (10,000 acre-feet/year) still being added as storage. The 508-14 technical committee reviewed recent (1986-2001) water level data for the pilot project area and concluded that during that time period, the vast majority of wells monitored exhibited no significant rises or

declines. Therefore, the shallow hydrologic system in the southern half of the 508-14 Area now appears to be in equilibrium.

3) Ecology has about 50 water right permit applications on file, for a total of approximately 12,000 acre-feet/year of "new" groundwater. If 10% of that water infiltrates beyond the root zone and returns to the groundwater system, consumptive use of the new groundwater withdrawals would be approximately 10,800 acre-feet/year. The 508-14 technical committee estimates additional future water use in the pilot project area will be approximately 10,000 acre-feet/year for municipal and industrial purposes and 3,000 acre-feet/year for domestic supplies. If 60% of that water is returned to the groundwater system via infiltration and water treatment facilities, then the increase in consumptive use is estimated to be about 5,200 acre-feet/year. The technical committee believes most of the 16,000 acre-feet/year of the newly-appropriated water that would be pumped from the ground for future consumptive use (total consumptive use of pending applications and estimated future withdrawals) would come from water currently in "storage" in the 508-14 Area groundwater mound, and should result in water level declines in some parts of the mound. The committee believes only a minor portion of the newly-appropriated water removed for future consumptive use would come from groundwater currently flowing through the pilot project area. Therefore, the technical committee believes that extraction of groundwater would not have any measurable impact on the hydrologic system in the pilot project area. As a result, the reduction in groundwater discharging from the pilot project area should be minimal and therefore should have minimal impact on receiving water bodies.

4) The technical committee recommends that future groundwater monitoring be conducted in the pilot project area in order to:
   - Evaluate the need for the installation of additional monitoring wells to collect water level data in areas with no historic groundwater data;
   - Recognize long-term water level trends and to establish criteria for managing the groundwater resources in the pilot project area; and
   - Determine options for mitigation of impacts, if necessary.

Executive Level Meeting with the USBR

On September 24, 2002 a meeting was held in Yakima with Bill McDonald, Regional Director of the USBR, and his senior staff together with Tom Fitzsimmons and his senior staff regarding the 508-14 area and implementation of SHB 2874. A key portion of the meeting was to discuss the results of the technical committee report and to determine if a pilot project for the 508-14 area was acceptable to the USBR senior management. The following decisions were made at the September meeting:

- To move ahead with a pilot project to allocate water within the 508-14 area similar to the Quincy Basin.
- To have the USBR and Ecology jointly consult with National Marine Fisheries Service (NMFS) for the Section 7 consultation needed by the USBR to issue a new license for the 508-14 withdrawals.

- To focus the consultation with NMFS utilizing the technical committee report which shows the 508-14 pilot is likely to affect, but not adversely affect under the 2000 NMFS biological opinion.
- To implement the monitoring and mitigation recommendations outlined within the technical committee report.

Future Efforts Required to Implement SHB 2874

The next meeting of the 508-14 Area policy and technical committees will be held on December 19, 2002. The following issues will be discussed:

- Strategy for consultation by USBR and/or Ecology with National Marine Fisheries Service (NMFS) regarding the potential for impacts to the Columbia River and/or its tributaries from pumping additional groundwater in the pilot project area (southern half of the 508-14 Area);
- Scope and schedule for the development of an agreement between Ecology and USBR for allocation of the "naturally occurring" and "stored" groundwater in the pilot project area;
- Development of a draft scope of work for the collection of additional groundwater monitoring data in the pilot project area; and
- Plans and schedule for Ecology to develop a rule for the future appropriation of groundwater in the pilot project area.

It is anticipated for January 2003 that Bill McDonald and Tom Fitzsimmons will schedule a meeting with NMFS to discuss the 508-14 pilot program and begin the required consultation to gain approval for a new license for the USBR to issue water for the 508-14 pilot area.

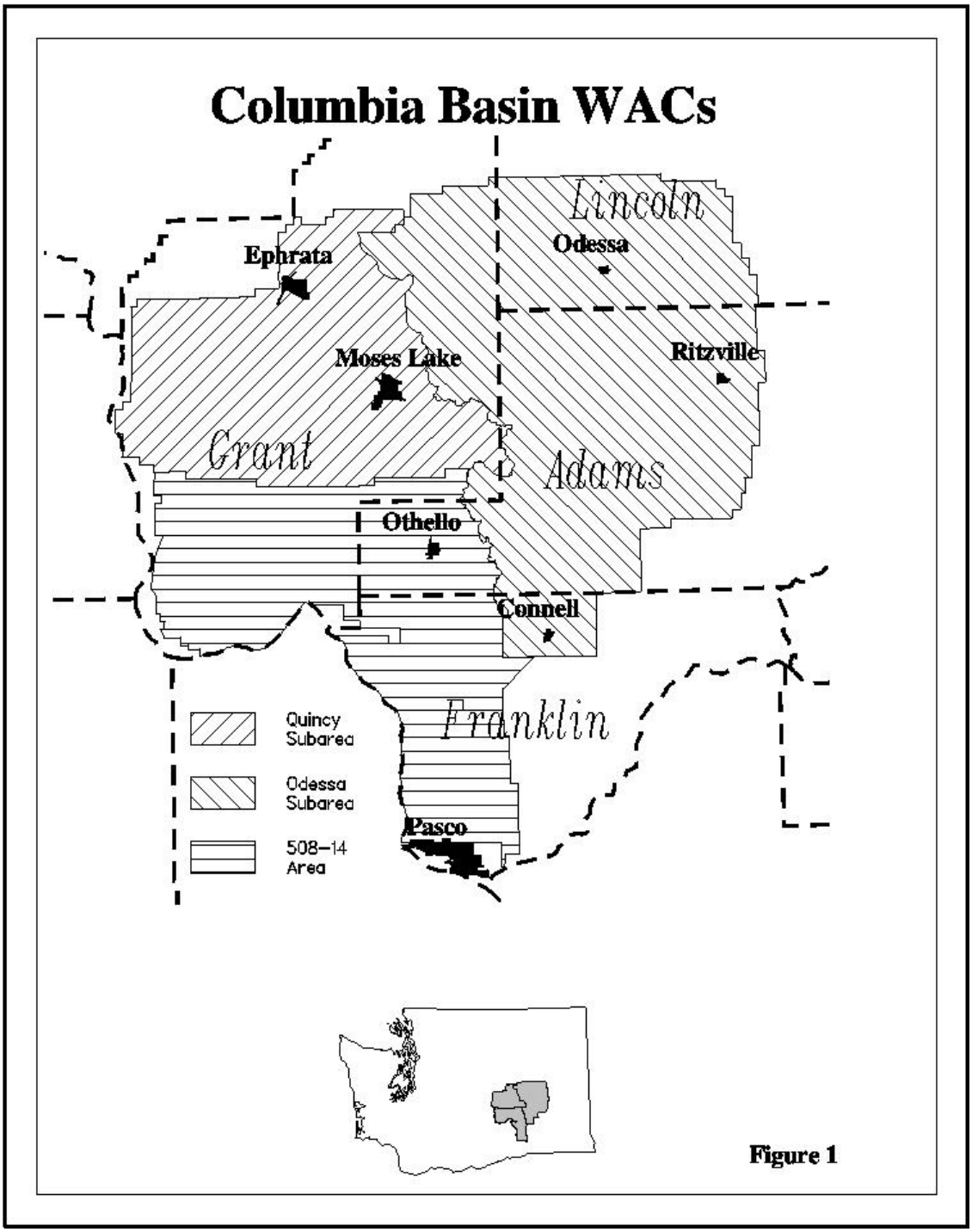
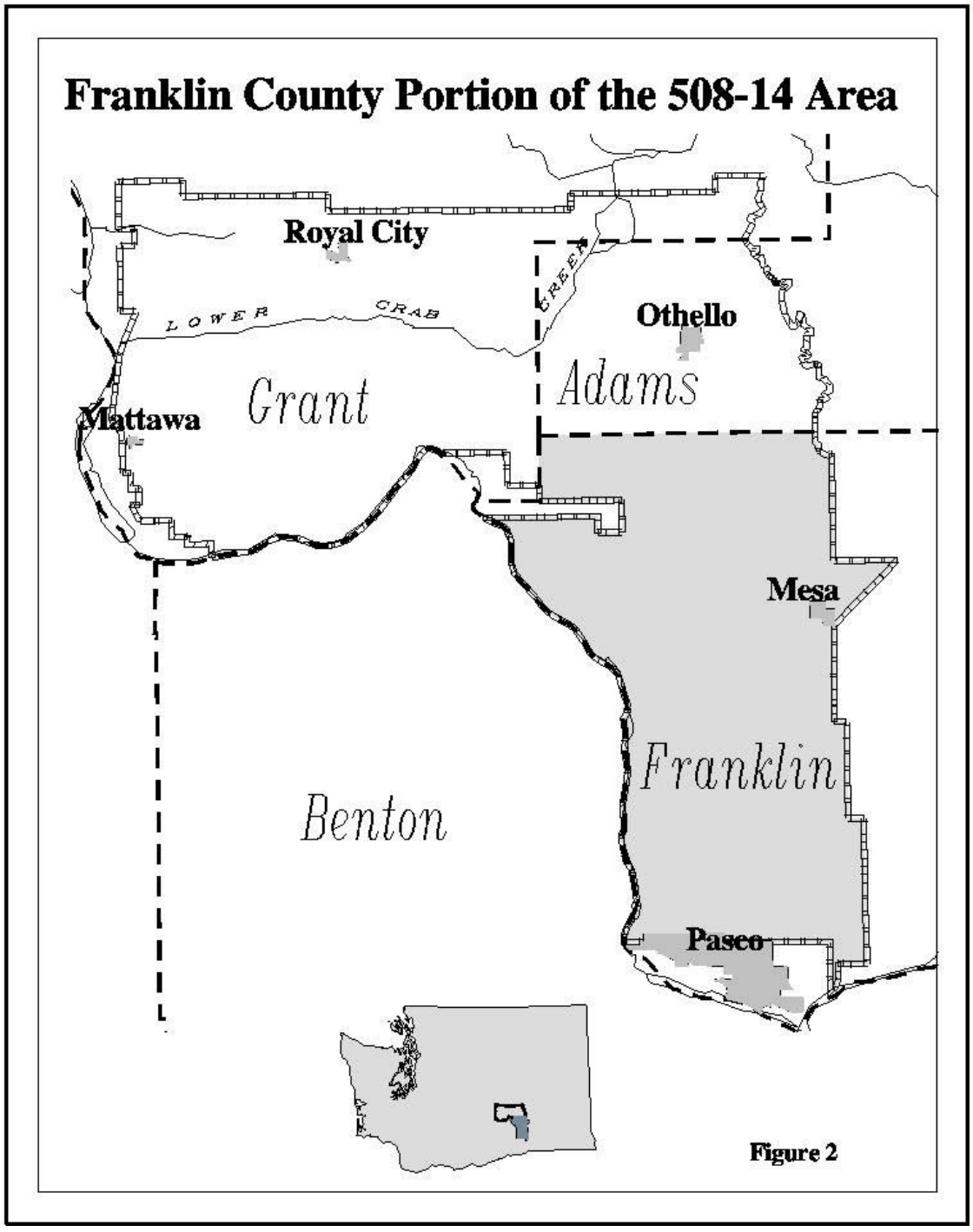

Columbia Basin WACs
Lincoln
Odessa
Ephrata
Moses Lake
Ritzville
Grant
Adams
Othello
Connell
Franklin
Quincy Subarea
Odessa Subarea
508–14 Area
Pasco

Figure 1


Franklin County Portion of the 508-14 Area
Royal City
LOWER CRAB
CREEK
Othello
Grant
Adams
Mattawa
Mesa
Franklin
Benton
Paseo
Figure 2

ATTACHMENT 1

EPH-2500
WTR-4.00

MEMORANDUM

To: William Gray,
Deputy Area Manager, Ephrata, WA

From: 508-14 Technical Committee

Subject: Summary of Ground Water Issues and Impact Assessment for the 508-14 Pilot Program, Columbia Basin Project (Project), WA

This summary of ground water issues and impact assessment was written to provide useful information for upcoming meetings between the US Bureau of Reclamation (Reclamation) and the WA Department of Ecology (WADOE).

Background and History

- WA Administrative Code (WAC) 508-14, designated May 15, 1967, governs the withdrawal of public ground water within the shallow management zone (above the Grande Ronde basalt) within the Project area lying south of O'Sullivan Dam in Adams, Grant and Franklin Counties.
- In 1997, the US Geological Survey (USGS) published a report (WRI 96-4086) which estimated that a ground water mound of approximately 5 million acre-feet has developed in the USGS study area, which included parts of Franklin and Benton Counties, due to irrigation development. About 4.7 million acre-feet of the ground water mound is within the Franklin County portion of the WAC 508-14 area (hereafter called the pilot program area) and is a direct result of waste, seepage and return flows of the Project.
- Prior to 1967, WADOE issued 54 water right certificates within the pilot program area (for 7,984 acre-feet). Since 1967, WADOE has issued 163 permits within the pilot program area (for 100,211 acre-feet for which proofs have been submitted). These permits are premised on a future determination of the availability of public ground water. These existing permits have priority dates senior to Reclamation's June 1, 1993 moratorium on new or additional use of Project water.
- The USGS report determined that approximately 56,000 acre-feet per year is the quantity of ground water that moved through the USGS study area prior to irrigation development. The pro-rated quantity for the pilot program area would be approximately 47,247 acre-feet per year.

- Substitute House Bill 2874 was signed by Governor Locke on April 3, 2002 which authorizes WADOE to enter into a joint management program with Reclamation for the 508-14 area. The program aims to put the Project ground water to beneficial use with some accommodation for current permit holders (a program similar to the Quincy Ground Water Subarea).

Joint Management Program

1. Initiate a pilot program, encompassing the Franklin County portion of the 508-14 area.
2. Certificate water right permits up to the amount of public ground water quantified by the USGS study. WADOE can certificate an additional 49 permits (39,263 acre-feet per year). The water appropriated by the remaining permits (114 permits) is considered Project ground water.
3. WADOE would modify the 508-14 Rule to reflect the quantification of public ground water available within the pilot program area.
   Reclamation would issue a license to the remaining permit holders, possibly with a fee phased-in over time. The quantity of water being put to beneficial use under these permits is existing diversion and therefore is covered under the 2000 Federal Columbia River Power System biological opinion which included consultation for the Columbia Basin Project (Bi-Op).
4. The program would appropriate water for future uses. Many municipalities are actively looking for additional sources of water. There are currently 46 water right applications on file with WADOE in the pilot program area, mainly for agriculture. Approximately 55 domestic wells (exempt from water rights) are drilled per year in Franklin County.

Objectives

The objectives of the joint management program are:

1. To provide water from ground water storage for growth in municipal and industrial water use and additional irrigation use.
2. Provide for growth in rural domestic water use.
3. Protect and sustain the reliability of surface water and ground water supplies for the benefit of current and future use.
4. Have a minimal impact on Columbia River flows in consideration of ESA issues related to the Bi-Op.

Ground Water Issues

In order to implement the pilot program, the technical committee (consisting of WADOE, Reclamation and Columbia Basin Project Irrigation District representatives) was asked to review existing information to identify data gaps, investigate changes that have occurred to the hydrologic system since the USGS study, look for additional data available since the USGS study, and assess potential impacts to Columbia River flows relative to ESA implications.

Data Gaps

The USGS report provides a foundation upon which we can recommend a pilot program to appropriate additional ground water in Franklin County. The study quantified all the various components of the ground water budget and showed how conditions have changed since pre-development. However, determining impacts from new pumping requires spatially distributed information that may not be available in the USGS report.

For example, the shallow water table aquifer system delineated in the USGS study includes several geologic units which can have widely ranging hydraulic parameters. The uppermost unit in parts of the study area is the Pasco Gravel with an average hydraulic conductivity of 880 feet per day. In other areas, the upper Ringold silt and clay is at the ground surface. The upper Ringold has an average hydraulic conductivity of 25 feet per day. The aquifer that a well is completed in is important in determining likely impacts from new pumping since the hydraulic parameters of the aquifer determine the drawdown and area of influence caused by the pumping. Most of the irrigation pumping wells and most of the monitoring wells are within the Pasco gravel aquifer. The ground water mound, however, has built-up mainly within the bounds of the upper Ringold unit. There may be places within the pilot program area where new monitoring wells would be needed to determine impacts from new pumping wells.

Hydrologic System Changes Since the USGS Study

The USGS report noted that most of the study area was at equilibrium in 1986, with perhaps 10,000 acre-feet per year still being added to ground water storage. Since the study, the following changes have occurred in the study area:

1. About 27 miles of canals and laterals have been piped or lined since 1986.

2. Due to increased on-farm efficiencies, the Franklin Conservation District (FCD) estimates that irrigation application losses have decreased from 15% (1986) to 10% (2001).

3. More emphasis has been put on efficient water management scheduling to limit excess recharge past the root zone and control leaching of nitrates into the ground water.

4. There have been general cropping changes. More farms are utilizing the full growing season (mid-March to late October) by planting two crops in one season (i.e. early potatoes followed by late season Sudan grass).

5. There has been an increase in irrigated acreage in Franklin County. FCD estimates that 212,760 acres were irrigated in 1986 vs. about 230,000 acres in 2002.

The technical committee has reviewed recent water level information provided by the South Columbia Basin Irrigation District (SCBID) and compared these data to the conditions described in the USGS report. The shallow hydrologic system appears to be at equilibrium. Water levels vary seasonally in response to recharge from irrigation and discharge from pumping. However, the vast majority of wells monitored in the project area have exhibited no significant gains or losses to ground water storage since the growth of the ground water mound ceased more than 20 years ago. The hydrologic system changes listed above have not noticeably affected ground

water levels in the monitoring wells. The effects may be relatively small and difficult to quantify and/or may be delayed in time.

Additional Data Available Since USGS Study

The technical committee met with representatives of the tri-county (Franklin, Adams, and Grant Counties) Ground Water Management Area (GWMA) to discuss the types of data being generated for the GWMA and to determine if these data would be useful for our pilot program. The GWMA is currently finishing the first phase of their study which includes delineating the extent and thickness of the basalt units and interbeds. This stratigraphic information could be useful in areas where the basalt coulees and buried channels control ground water flow. However, the GWMA has not gathered water level data from the wells that they are using to delineate stratigraphy, which limits its usefulness. They also have not started on the second phase of their study which will concentrate on the more important unconsolidated sediments that overlie bedrock.

The technical committee also met with the FCD and discussed the types of ground water information that they collect. The FCD maintains the GWMA well log database and they also have several other GIS coverages which they made available for our use. They, and SCBID personnel, have a working knowledge of day-to-day field conditions and are a valuable source of information.

Preliminary Assessment of Potential Impacts

In order to estimate potential impacts of new ground water use, it is necessary to make some assumptions about quantities of water use and growth over the next 10 years. There is a minimal amount of irrigable land available for future agricultural development within the pilot project area.

There are approximately four dozen applications on file with WADOE for new water rights within the pilot program area. Irrigation is the primary use for most of these new applications. Many of the irrigation requests (particularly in the Smith Canyon area) are for supplemental water (new point of withdrawal); the remaining irrigation requests represent an additional 3,210 acres of irrigated land. New appropriations for irrigation will probably total 12,000 acre-feet or less. It is estimated that at least 10% of the pumped water would infiltrate beyond the root zone and return to the ground water system. Therefore, the consumptive use for these new withdrawals is estimated at 10,800 acre-feet per year.

Future water use estimates include 3,000 acre-feet per year for domestic well use and 10,000 acre-feet per year for future municipal and industrial water use. If 60% of the water is returned to the ground water system via water treatment facilities and infiltration, then consumptive use is estimated at about 5,200 acre-feet per year.

A significant portion of the estimated 16,000 acre-feet per year removed from the ground water system for future consumptive use should come from ground water currently in storage in the 508-14 mound, and should result in a decline in water levels in some parts of the mound. Only a

minor portion of water removed for future consumptive use should come from ground water currently flowing through the project area. As a result, the reduction in volume of ground water discharging from the project area is expected to be much less than 16,000 acre-feet per year and should therefore have minimal impact on receiving water bodies.

The irrigation and farming practice changes that have occurred since the USGS study have probably impacted the hydrologic budget by more than 16,000 acre-feet per year and yet there are no significant water level declines or negative impacts to the system. These water quantities are relatively minor considering a ground water budget of 390,000 acre-feet per year (USGS, 1997).

It is impossible to predict the spatial or temporal impacts of future pumping without the use of a ground water flow model and more information than is currently available. However, a review of the data shows that a modest amount of ground water can be extracted without causing a measurable impact to the hydrologic system. We do not expect to see any significant impacts from the pilot program in the 508-14 area.

Future Pilot Program Monitoring

The technical group recommends the following steps be taken to prepare for future monitoring of the pilot program:

1. Evaluate the necessity of additional monitoring wells to fill-in areas considered vulnerable to water level declines.

2. Establish long-term criteria for managing ground water use such as limitations or selective restrictions on new allocations in areas where ground water pumping might negatively impact project facilities.

3. Determine mitigation options, quantities, and related issues.

508-14 Technical Committee:

Kayti Didricksen, USBR
Dan Hubbs, USBR
John Covert, WADOE
Keith Stoffel, WADOE
Darvin Fales, SCBID